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Indian Standard

METHOD FOR DETERMINING RESISTANCE TO
PENETRATION BY WATER OF FABRICS BY
HYDROSTATIC HEAD TEST

(First Revision)

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METHOD FOR DETERMINING RESISTANCE TO PENETRATION BY WATER OF FABRICS BY HYDROSTATIC HEAD TEST

(First Revision)

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Indian Standard

METHOD FOR DETERMINING RESISTANCE TO PENETRATION BY WATER OF FABRICS BY HYDROSTATIC HEAD TEST

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 7 July 1975, after the draft finalized by the Chemical Methods of Test Sectional Committee had been approved by the Textile Division Council.

0.2 This standard was first published in 1952 and has been revised to make it up-to-date.

0.3 Water passes through water-resistant fabrics by:

- a) penetration of water through their interstices under its own or applied pressure (the resistance offered by fabrics to this action is influenced mainly by their construction or structure);
- b) wetting of one side of the fabrics followed by capillary action, thus bringing the water to the other side and wetting it (the resistance offered by fabrics to this action is influenced mainly by their water-repellency); and
- c) a combination of (a) and (b).

0.4 A number of test methods have been developed for testing waterproofness, water repellency and water resistance of fabrics like spray test, hydrostatic head test, Bundesmann test and cone test. The use of a particular test depends upon the type of fabric under test and its end use. So far no correlation has been established between the results of different test methods and hence their results are not comparable.

0.5 The hydrostatic head test prescribed in this standard is a relatively simple test indicating the effect of fabric structure on its resistance to penetration by water. The resistance offered by the fabrics to penetration of water is expressed in centimetres of static head of water.

0.6 In reporting the result of a test made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes a method of determining the resistance of fabrics (permeable as well as non-permeable to air) to water penetration by hydrostatic head test.

2. SAMPLING

2.1 Samples drawn in compliance with the procedure laid down in the material specification or as agreed to between the buyer and the seller shall be taken as representative of the lot. In case of cotton fabrics reference to IS : 3919-1966† shall be made.

2.2 At least eight test specimens, each 100 × 100 mm, shall be drawn at random from each individual piece in the test sample.

3. CONDITIONING AND TESTING ATMOSPHERE

3.1 The test specimens shall be conditioned in accordance with IS : 6359-1971‡ except in case of fabrics heavier than 270 g/m² for which the minimum conditioning period shall be 48 hours.

3.2 The tests shall be preferably carried out in standard atmosphere (see IS : 196-1966§). In case it is not possible to carry out the test in standard atmosphere, the specimens shall be conditioned as provided for in 3.1 and tested in prevailing atmosphere immediately thereafter.

4. APPARATUS

4.1 The apparatus shall meet the following requirements:

- a) Means shall be provided for clamping the specimen of fabric in such a manner that:
 - 1) the specimen is horizontal,
 - 2) a circular area of the fabric (50 mm dia) shall be subjected to a steadily increasing water pressure on one face,
 - 3) no leakage of water at the clamps shall occur during the test period,
 - 4) the specimen shall not slip in the clamps, and
 - 5) any tendency for penetration to occur at the clamped edge of the specimen is arrested.

*Rules for rounding off numerical values (revised).

†Methods for sampling cotton fabrics for determination of physical characteristics.

‡Method for conditioning of textiles.

§Atmospheric conditions for testing (revised).

- b) The distilled water in contact with the test specimen shall be maintained at $27 \pm 2^\circ\text{C}$.
- c) The rate of increase of water head shall be 100 ± 5 mm/min.
- d) The manometer connected to the testing head(s) shall allow pressure to be read to an accuracy of 5 mm head of water.

NOTE — A suitable apparatus is described in Appendix A.

5. PROCEDURE

5.1 Prepare the apparatus for the test as advised by the manufacturer. Wipe all water from the clamping surface. Take the specimen and clamp it on the testing head in such a manner that there is an air space between the face of the fabric and the surface of water. Immediately subject the specimen to increasing water pressure [see 4.1 (c)]. Watch continuously for evidence of penetration by the water through the specimen.

5.2 Carefully observe for drops of water forced through the cloth. Ignore drops coming through the test specimen at the first two places. Record the head of water in centimetres immediately when a drop of water comes through a third place in the specimen.

5.3 Repeat the test with the remaining test specimens.

6. REPORT

6.1 The report shall include the following information:

- a) Type of fabric;
- b) Number of test specimens tested; and
- c) Mean resistance of fabrics, in centimetres of water head.

APPENDIX A

(Note in Clause 4.1)

HYDROSTATIC HEAD TEST APPARATUS

A-1. DESCRIPTION

A-1.1 The apparatus shall consist of the following (see Fig. 1 and 2):

- a) *Brass Cylinder (M)* — Closed at the bottom and open at the top, provided with a tube *R* at the side, the latter serving as inlet and outlet for water. The smooth flanged top of the cylinder in order to prevent damage to the test specimen, shall be provided with a ring of thin rubber of 50 mm internal diameter (for details and dimensions of the cylinder, see Fig. 2).

- b) *Ring Clamping Device* — A device to clamp a metal ring to top of cylinder *M* by screw *J*. The metal ring of 50 mm internal diameter, in order to prevent damage to the test specimen, is provided with a ring of thin rubber of 50 mm internal diameter.
- c) *Graduated Glass Tube* — With the zero mark exactly in level with the top of the cylinder *M*.
- d) *Water Reservoir* (see Fig. 1) — To constantly supply water to the constant water head vessel *C*.
- e) *Constant Water Head* — The diameter of the end of its outlet tube *G* is so adjusted that when it is delivering water into graduated tube *H*, the level of water in it rises at a constant rate of 100 mm/min.

A-2. OPERATION

A-2.1 Close taps *K*, *L* and *F* and open taps *S* and *B*. Allow the distilled water from the reservoir *A* (maintained at $27 \pm 2^\circ\text{C}$) to run into the vessel *C* till it attains a constant level. (The water will maintain constant level when it has reached the top of the overflow tube *D*, all excess water being drained off through the tube *D*.) Close tap *S*, open taps *L* and *K* and fill the brass cylinder *M* with water till it is nearly full. Close the tap *K* and open the tap *S*. Lay the test specimen on the rubber ring of the cylinder *M*. Place the clamping ring on top of the test specimen and fix the former rigidly by operating the screw *J*. Open the tap *F* to allow inflow of water into the tube *H*. (Just as the level of water in tube *H* begins to go above zero mark the test specimen which is at the same level should begin to bulge.) Continue the flow of water steadily into the graduated tube *H* at such a rate that the level of water in the tube rises by 100 mm/min.

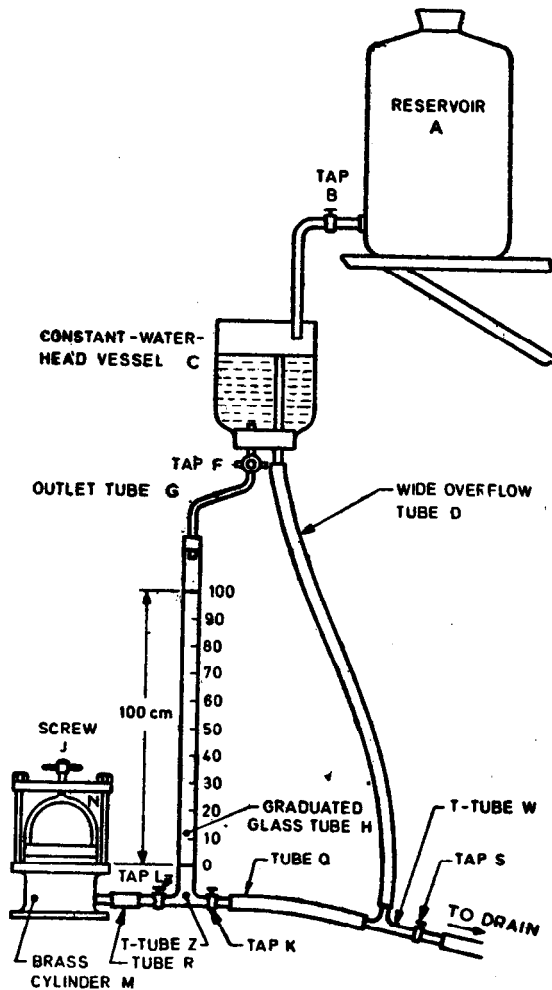
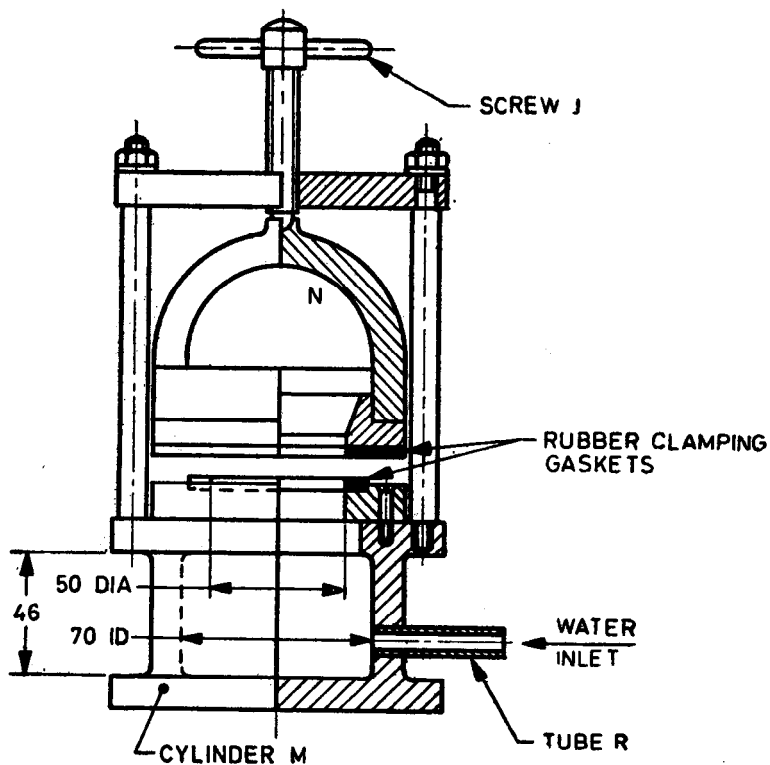


FIG. 1 HYDROSTATIC HEAD TEST APPARATUS



All dimensions in millimetres.

FIG. 2 TEST-HEAD OF HYDROSTATIC HEAD TEST APPARATUS

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ON

CHEMICAL METHODS OF TEST FOR DIMENSIONAL CHANGES AND WATER PROOFNESS

IS:

- 9-1963 Determination of dimensional changes of cotton and linen woven fabrics on washing near the boiling point (*revised*)
- 391-1975 Determining resistance to penetration by water of fabrics by hydrostatic head test (*first revision*)
- 392-1975 Determining water absorption and penetration of fabrics using Bundesmann type apparatus (*second revision*)
- 665-1962 Determination of relaxation shrinkage of woven fabrics containing wool
- 1299-1963 Determination of dimensional changes on washing of fabrics woven from rayon and synthetic fibres
- 1313-1958 Determining shrinkage of knitted goods containing wool
- 2977-1964 Determination of dimensional changes of woven fabrics (other than wool) on soaking in water
- 3561-1966 Determination of dimensional changes on washing of woven silk fabrics
- 4419-1967 Determination of dimensional stability of knitted fabrics made of synthetic fibres

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